

## Antenna diversity techniques

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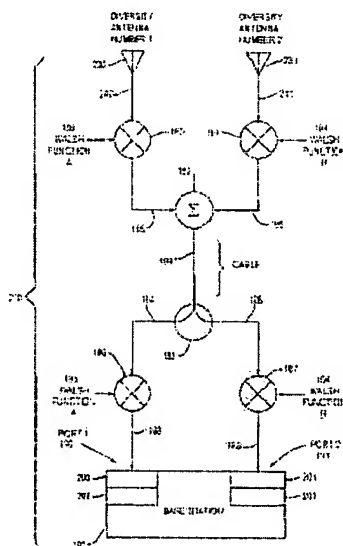
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Abstract not available for JP 10509848 (T)

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A receiver system for antenna diversity employing a single backhaul cable. A single backhaul cable couples a receiver to a plurality of antennas. The signals from the antennas are combined onto the single backhaul cable using frequency offsets, spread spectrum code division, time division, or a combination thereof. At the receiver, the signals from the antennas are decoupled. In the case of frequency offsets, the antenna signals are decoupled by splitting the backhaul signal into a plurality of duplicate signals, frequency shifting selected ones of the duplicate signals, and correlating said frequency shifted signals. In the case of spread spectrum code division, the antenna signals are decoupled by splitting the backhaul signal into a plurality of duplicate signals and demultiplexing each of the duplicate signals with a different spread spectrum code. One or more antennas may be selected for communication in response decoupling the antenna signals.



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(54) 【発明の名称】 アンテナダイバーシティ技術

(57) 【要約】

単一の帰路ケーブル (152又は199) を使用したアンテナ・ダイバシティのための受信機システムである。単一の帰路ケーブル (152又は199) は受信機を複数のアンテナ (130及び131又は230及び231) に接続される。上記アンテナ (130及び131又は230及び231) からの信号 (140及び141又は195及び196) は、周波数オフセットやスペクトル拡散コード分割、時分割、又はそれらの組み合わせを用いて、単一の帰路ケーブル (152又は199) に接続される。受信機において、上記アンテナからの信号が減結合される。帰路信号を複数の複製信号に分割する場合には、その周波数は複製信号の選択された信号について偏移され、また周波数偏移信号を相関する。スペクトル拡散コード分割の場合には、上記帰路信号を複数の複製信号に分割し、かつ異なるスペクトル拡散コードで各複製信号を多重分離することにより、アンテナ信号は減結合される。アンテナ信号を減結合することに対応して、1つ又はそれ以上のアンテナは通信のために選択してもよい。

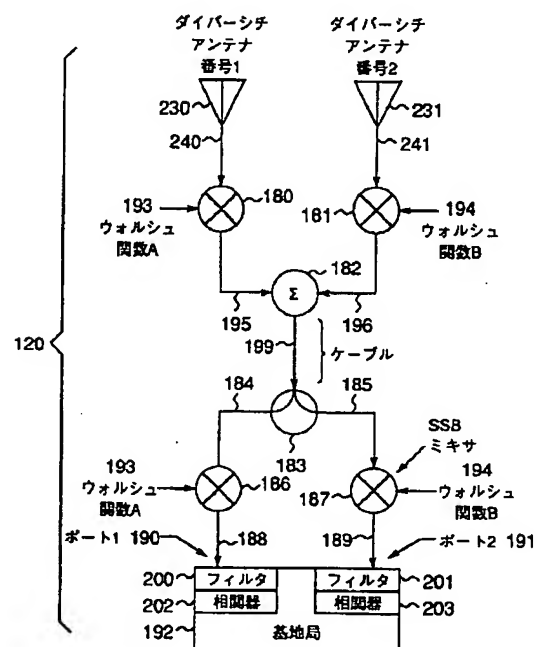


図4

Y ` ̣ " " z

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Q ' A e i ~ A

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e i M e P ' A ̣ L A e i M ... ̣ e P ' ' " f • ̣ - ~ ̣  
A ; I t Z b g M > ̣ • ̣ % ̣ i ~ A

̣ L I t Z b g M A H M < ~ A A H P [ u ~ M • ̣ %  
̣ i ~ A

̣ L A H P [ u - † ̣ A ̣ L A H M M A ̣ L A H M A P '  
i » M " ̣ L A e i P ' . • ̣ i i » M " • ̣ % ̣  
i ~ A

̣ L g " . † ̣ % M e P ' " A w f † ̣ % f l ̣ g ̣ ̣ ~  
S g L • ̣ ̣ L A e i M " ̣ P ' 1 f ̣ / A P ' " » ̣  
" ̣ ̣ L i » M g . • ̣ % ̣ i ~ 1 f % M ̣ V X e B  
Q D ̣ L " f • ̣ % ̣ i " A > " > ~ P ' P / g ~ L T 1 f % ̣  
P L V X e B

R D ̣ L P / g ~ L T " A ̣ L g I t Z b g ̣ L A e i M P '  
A

̣ L g . • ̣ % ̣ i " A t g I t Z b g ̣ L i » M  
P ' • ̣ Q P / g ~ L T 1 f % ̣ Q L V X e B  
S D ̣ L g I t Z b g " A ̣ L M M R q [ g Q {  
t ̣ < † > " ̣ ̣ P L V X e B

T D ̣ L g " . † ̣ % M ~ - † ̣ % M ̣ † 1 f % ̣ P L  
V X e B

U D ̣ L M ̣ " X y N g g U 1 f % ̣ T L V X e B

V D ̣ L M ̣ " A » ̣ . I " " ̣ † ̣ % i ̣ ^ ̣ ~ A • M %

̣ L g " . † ̣ % M P ' I • ̣ ̣ T L V X e B

W D ; A e i M M • ̣ % V X e ~ ~ A

MM M • Ø - ~ ~ AA e i M » E ... E > ¶ • Ø - ~ "  
 - « Ø ; A e i ~ A  
 " % d p ç ~ e A e i M " f A ; " % d † E % M  
 > ¶ • Ø % L i ~ A  
 ° L " % d † E % M AAHP [ u ~ M • Ø % AHM  
 < • Ø % L i ~ A  
 ° LAHM M A ° L ; " % d † E % M e X % d " f  
 • Ø - ~ LA ° LAHM ' ° LA e i M ~ ¶ • Ø % L i ~  
 1 f % V X e B  
 XD ° L ; % d " f † E % M M A ° M % ° L ; % d " f  
 M P ' I • Ø % M @ † 1 f % ; WL V X e B  
 PODA e i M » E ... E > ¶ • Ø - ~ " - « Ø ; A e i ~ A  
 ° L ; A e i e X - † E A ; A e i M AP ' AHP  
 [ u ~ M • Ø % AHM < • Ø % L i 1 f A AHM  
 " ° L ; A e i M a L ; I < † ç L A  
 M @ ~ A  
 ° L M @ - † E A ° LAHM ; A e i M , • Ø  
 % L i ~ 1 f % MV X e B  
 PPD ° L M @ " A » E . I " i ; ^ ç ~ A ° L ; A e i M  
 P ' " » E " ° I • Ø ; POL MV X e B  
 PQD ° L < • Ø % L i " A ° L ; A e i M " % d • Ø  
 % L i 1 f % ; POL MV X e B  
 PRD ° L , • Ø % L i " A ° L ; A e i M " % d "  
 f • Ø % L i 1 f % ; PQL MV X e B  
 PSD ° LA e i M " % d • Ø % ° L L i " A ° L ; A  
 e i M e X A " Ø EI V ~ ~ † • Ø % L i 1 f % ;  
 PQL MV X e B  
 PTD ° L ; EI V e X " A ... • Ø EI V W '

I ‡Œ%¿ PSL MVXe B  
 PUDªL <•Ø% Łi" A eW{»M "eA eim .•Ø;  
 W{»M Ø% Ai OefW^ ~•~A  
 ªL; W{»M " %d•Ø% Łi~ 1f%¿ POL  
 MVXe B  
 PVDªL M@"AªL; A eim P' "»Œ"ª I •Ø%  
 I \_Co[V` gp•Ø¿ PPL MVXe B  
 PWDªL M@"AªL; A eim P' "»Œ"ª I •Ø%  
 <\_Co[V` gp•Ø¿ PPL MVXe B  
 PXDªL, •Ø% Łi"A  
 ªLAHP[u -‡ŒAªLAHM M AªLAHM AP'  
 i»M "ªL; A ei eX .•Ø; i»M "•Ø%  
 Łi~A  
 ªL g " . ‡Œ%M eP' "Awf‡Œ%flŒ g - S g  
 L•ØªL; A eim "ØP' 1fØ / AªL; ;  
 »M /¿ P' "»Œ"ª g .•Ø% Łi~A  
 g " . ‡Œ%M M•Ø>">~ P' ~ 1f%¿  
 POL MVXe B  
 QODªL <•Ø% Łi"AªL; A eim eX A Ł  
 g fl"f•Ø% Łi 1f%¿ POL MVXe B  
 QPD; A eim M•Ø% u-`~A  
 M‡Œ%XYNg gUM ~AA eim »Œ...Œ>Œ•Ø  
 -~"~«Ø; A ei~A  
 ªL; A eim -‡ŒAªL M‡Œ%XYNg gUM  
 Ł <‡Œ Ł g ItZbg ªL P A eim æ ~  
 A ItZbgM >Œ•Ø P P P/g ~LT~A  
 ªL ItZbgM ~ Q ªLA eim ~ AAHM <•Ø`Z  
 ~A

¢ LAHM " ` † ¢ Ø AHP [ u ~ A  
 ¢ LAHP [ u ' ¢ LAHM M At g ItZbg ¢ L  
 AHM æ • Ø Q P / g ~ LT ~ A  
 ¢ LAHP [ u ' ¢ LAHM M A ¢ L Q P / g ~ LT o  
 " M • Ø M@ ~ 1 f % uB  
 Q Q D ¢ L M@ " A > " > ~ P ' XyNg gU 1 f % ¿ Q  
 PL uB  
 Q R D ¢ L M@ " A • M % A ¢ LAHM ~ ¢ L Q P / g ~ LT  
 ¢ Lo " / ¿ P ' I • Ø ¿ QPL uB  
 Q S D ¢ L g ItZbg " A ¢ LXyNg gUM Rq [ g  
 Q { t L < † > " ¢ ¿ QPL uB  
 Q T D ¢ L ItZbg M ~ A ¢ L ; A eim ¢ L Q M " A  
 ¢ g " f † ¢ % ¿ QPL uB  
 Q U D ; A eim M • Ø % u - ~ A  
 ; A eiu ` 1 f A ¢ LeA eiu " A  
 MM ~ A eim o " • Ø - ~ " « Ø A ei ~ A  
 ¢ LA eim - † ¢ A ... A eiu ` S ~ ~ " " Ø Xy  
 Ng gUR [ h p ¢ ~ A XyNg gUM > ¶ • Ø XyNg gU ~ †  
 ~ 1 f A  
 ¢ L u " A  
 AHP [ u ¢ [ - † ¢ A ¢ LXyNg gUM ¢ LAHP [ u  
 • Ø • M % AHM < • Ø % Li ~ A  
 ¢ LAHP [ u ... [ - † ¢ A ¢ LAHM i u  
 ~ " • Ø % Li ~ 1 f Ae u " A XyNg gU  
 1 f A ~ ¶ M o " A  
 ¢ L ; u - † ¢ % M@ 1 f % uB  
 Q V D ¢ L M@ " A ¢ L ~ ¶ † ¢ % ; M , I ~ M i ¿ ^ ¢ ~  
 A ¢ L ; u ' I • Ø % Li † 1 f % ¿ Q  
 U

L u B  
 QWD<sup>a</sup>L; A eiu ` eP' .•Ø<sup>a</sup>LXyNg gUR[h  
 "A<sup>a</sup>L; A eiu ` ... S~ .•ØXyNg gUR[h  
 ~... •Ø¿ QUL uB  
 QXD; A eim M•Øß@- `~A  
 i A ei pç~A MM M•ØXebv A-Æ  
 ~AeA ei"A eim >¶•Ø-~"-«A  
 eeA eim "ØXyNg gUR[h~+~A; XyNg  
 gUM >¶•ØXebv~A  
<sup>a</sup>L; XyNg gUM AAHP[u ~\*M•Ø% K  
 %AHM <•ØXebv~A  
<sup>a</sup>LAHP[u %./Æ[ ¨ç~A<sup>a</sup>LAHM A; i»M  
 " •ØXebv~A  
 ei»M XyNg gUR[h~ •ØXebv~A  
 °M % A<sup>a</sup>L; M >">~ P' I •ØXebv~  
 ß@B  
 ROD<sup>a</sup>LI •Ø% Xebv~A<sup>a</sup>L; M .I~M i¿  
 "L•ØXebv ¿ QXL ß@B  
 RPD<sup>a</sup>L; A eim eP' ~+•Ø% pçÆ%<sup>a</sup>LXyN  
 g gUR[h~A<sup>a</sup>L; A eim ... S~ ~+•Ø% pç  
 Æ%XyNg gUR[h~... •Ø¿ QXL ß@B  
 RQD MM ~AA eim >Æ...Æ>¶•Ø-~"-«Ø>"  
 >~ Q' I "f‡Æ%A ei~A  
<sup>a</sup>L>">~ Q' A ei >">~ P' .~ ¶ÆA<sup>a</sup>L>  
 ">~ P' A ei' <sup>a</sup>LA eim M•Ø% "~Ao"  
 ~L A<sup>a</sup>LA eim S g ' ItZbg‡Æ% S g L  
 •ØItZbgA eim o"•Ø>">~ P' ~LT~ 1fA<sup>a</sup>L  
 ItZbg~A<sup>a</sup>L MM L <‡>A

¢LA eiM ~ ¢LItZbgM "A`Z >">~ Q' "  
 - ‡EA ¢L`Z "AHP[u •Ø M % AHM o" A  
 ¢LAHP[u " " - ‡EA ¢L " "AP' i»M " ¢L  
 A ei eX . •Ø>">~ Q' i»M o" A  
 ¢Li g " . ‡E%M eP' "Awf‡E%flE g -  
 S g L•Ø ¢Li A eiM "ØP' 1fØ / A ¢Li  
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 A H P [ u ~ • Ø - ~ " A R X g ~ Ø ~ ¢ / \_ L • Ø B Æ f ,  
 A A e i " M @ ' T } C ' f Æ ~ ¢ Ø " , ¢ - ~ - " ~ ¢ B »  
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 " A " o " / B  
 i A e i v † Æ ~ ¢ Ø M M • Ø % ; A H P  
 [ u , • Ø K v « " A f l ' \_ ~ ¢ Ø B Æ f , A » P [ u  
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 [ u e r V X e ~ , Æ Ø A H P [ u " A Æ f , e r A r f I A g  
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 K v " L / " s ¥ " - Ø B  
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 - > • Ø Z p æ • Ø - ~ " L - ° / B † A L † Æ %  
 ¥ " ' ~ ¢ " ¢ » A H P [ u ' ¶ ~ M † Æ Ø f [ ^ ' ` †  
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M ' I ‡E%M g Vtgi g J j‡ „ A> ~ªL  
 g " Vtg‡E%M •Ø-~ LAA eim ", ‡EØB  
 XYNg gU " %d E "AAHM i i>M " A  
 i i>M eX " `%XYNg gUR[h~%d" f•Ø-~  
 LAA eim ", ‡EØBP' "»E"ª A ei"A; A  
 eim , •Ø-~ ~A°M % I ‡E~ çB  
 D ç {Æ~"A; A ei' M "A " `%XYNg gU  
 R[hV[P X pç~ E% " `%M " f " `%XYNg g  
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 | [g•Ø-~ " «ØB» / "P' {Æ~"A; %d»M %  
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} P ¨ ç ~ A M@PPS " AA eiPPQ oR ~ qeM PPR

† ` l - M • Ø BqeM PPR " A M@G Ng jNXidq

æHjPOQ ~ ; { A eiPOR ıf% M@VXe L M † E

ØBA eiPOR " A M@G Ng jNXPOQ ' L f u ç ~

u ' E ~ ç Ø BeA eiPOR , ~ P ' " , • Ø ' AHP [ u PO

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 N g j N X P O U o " " A A H P [ u P O T P ' - ‡ E Ø B e A H  
 P [ u P O T " A M @ G N g j N X P O Q ' u ~ ‡ Ø | [ g P O V  
 - ‡ E Ø B  
 } P V X e " ; A e i P O R T [ r X • Ø% ; P [ u  
 P O T K v ~ • Ø B ‡ A } P V X e " ; A e i P O R , ~  
 P g " , • Ø ; g P [ u M G N g j N X P O U K v ~ • Ø B  
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 ‡ E Ø C { A e i e p ‡ Ø - " - « Ø B  
 } Q { E - " A M V X e P Q O " A M @ P P S ' q e M P P R  
 M A M @ P P S " A M V X e P Q O " q e M P P R M • Ø ;  
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§ " ØBÆf, AAHP[u -M M•Ø% gp•ØAHP[  
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 "A» VXe - "A§ †Æ% ¿ "AHP[u "zu†Æ  
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 zu-«" ¢ ~ / L\_ " ØB  
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 - ØB- ¥ " "A§ †Æ% e' AHP[u A• " ¿P[u  
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 / "LA' ' L> " ¢ gp AAHP[u -A eiM  
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 - gp , ~-K - " " ¢ B  
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 gp†Æ~ ' ¢ B}S {Æ "A XªQ' A ei ' ¢ ~f ~ ¢  
 Ø "A' ' "Av P[V LKv~†ÆØC { A ei W  
 J~«ØB}S VXe - "A M@VXe QPO "A M@PPS'  
 qeM PPR M A M@PPS "A M@VXe QPO "A qeM  
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 " A U ~ • " " ~ ¨ L A g - , ' " , E f l Ø B  
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 P " A » E ... E A e i Q R O ~ Q R P L > ¶ † E Ø B A e i M Q S O  
 ~ Q S P " A X y N g g U • M Z p p c % A H P [ u - M § c A  
 " % d » † E Ø B  
 } S , % P ' { E - " A e A e i M Q S O ~ Q S P " " ` %  
 ` b v R [ h - ~ † † E A ' ' » ¨ A H P [ u - M † E Ø B - /  
 ~ A P A e i M Q S O " A P ` b v R [ h P X R p c ~ A ~ †  
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 M Q S P " A P ` b v R [ h P X R ~ " " Ø Q ` b v R [ h P X S  
 p c ~ A ... ~ † P W P L ~ † † E A ... X y N g g U M P X U  
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 Q [ g 1 f Ø B  
 X y N g g U M P X T ~ P X U " ` Z P W Q L < † E Ø B ` Z  
 P W Q o " " A A H P [ u P X X ` ~ M † E % < M i - - - A "  
 " A A H M ~ c / B j - Ø B A H M " A { c I Q ' d " L ` % M  
 1 f A Q ' M " A P X y N g g U R [ h P X R L ~ † † E % A  
 e i M Q S O A y A Q X y N g g U R [ h P X S L ~ † † E %  
 A e i M Q S P - Ø B P [ u P X X Ø M O A P ' " » E "  
 ¨ ~ L T A t B ^ A " G N g j N X i d q æ H j p c ~ A D  
 > " A H M " g " x [ X o h g \_ E R o [ W  
 - g ~ • i \_ E ~ • j † E A ' ' M @ [ i } f „ , B j ¨ c ~ K  
 " h e ~ ~ • † E Ø B æ f , A H M " A Y Z p ¨ c ~ m - Ø ß @  
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~ M K•Ø / ` < ~ ¢B ~ ` ~ ¢ ~ ~ AA eim PSO  
 ~ PSP g "x[Xo h g ~ ••Ø% æH"A†  
 ~ I " ' ¥" Ld; %n[hEGA o ~ AeA ei AbvX  
 g [ zu ~ ¢B

P[u PXX ...ß [ "A <†¢%M "M " PWR  
 LQ' ;»M PWS~PWT "††¢ØBP' ;»M PWS"A P  
 XYNg gUR[hPXR p¢~A PWU Ltgu†¢' '  
 †¢ØB... ;»M PWT"A Q XYNg gUR[hPXS p¢~  
 A PWV Ltgu†¢' ' †¢ØBe PWU~PWV"A  
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 " 1f~ ¢B

PWU o"PWW"A M@PXQiæf. n'j |[gPXO  
 -†¢ØB... PWV o"PWX"A n'PXQ ... |[gP  
 XP. -†¢ØBªq•Ø / A PWU o""A{¿I " P  
 A eim QSO ~¶iæ j†¢%o[W - LA PWV o  
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 ØB

PWU"AP[u PXX' AHM M A» AHM "AO  
 q / P XYNg gUR[hPXR L~††¢Ø P A ei  
 M QSO~A Q XYNg gUR[hPXS L~††¢Ø Q A  
 eim QSP~ 1fØB ' " A Q XYNg gUR[hPXS  
 p¢~ »†¢% Q A eim QSP A PWU" •ØB  
 Q' f¢%`bvr[h i P `bvr[h~ Q `bvr[h /  
 j v \_Ngi~j"A¢·I "G„ / " "z `¢M Lo•  
 -A PWU"A-¢ ~A{¿I " Q A eim QSP  
 G„ ~••ØB

PWV"A P A eim QSO •Ø"A Q A eim  
 QSP ~¶•Ø% fi¢ . -fi •ØB PWU~PWV

LAA eim QSO~QSP" ¢ "£†£ØB

PWU~PWV eX' o"~A n'PXQ " `%|[gP  
 WW~PWX <†£ØB- / ~A n'PXQ~A P |[gP  
 WW ¢~ P A eim QSO ~¶†£%o[W ~ Q |[g  
 PWX ¢~ Q A eim QSP ~¶†£%o[W ~ Afl  
 M•ØB

PWU~PWV~A~ ` TCOPUCQTT A~ ` TC  
 OQQCOSV A " }T ~ - - - L †£A "Q~•Ø-~  
 L-- O £%` oL ¢,£' L †£~¢Ø Zp »  
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 æ~~† PWO~PWP Lp¢ £~¢Ø`° XyNg gU »ß  
 @ ,¶ ~¢ØB "AV A 'p ¢,£'- LARq[  
 g'æRq[ g' ¢,£'- LA %"OQ~` %` ~` oL  
 "... m Zp L †£~¢Øflæ»y g bL OZpiKv" ,j  
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Æf,A}S {Æ~A~† PWO~PWP~ PWU~PWV  
 flæ» •Ø% A}U` f†£~¢Ø / Ax flæg bL  
 O [vUOP gp•ØBx flæg bL O [v LUN†£Ø L  
 " " L •ØBXyNg gUR[hPXR flæ o[W "A~†  
 PWO~ PWU ...ß ' I >¶†£Ø"AXyNg gUR[gP  
 XR ' I"o[W "A I ¢ x †£Ø- °/Bfl XY  
 Ng gUR[hPXS flæ o[W "A~† PWP~ PWV  
 ...ß ' I >¶†£Ø"AXyNg gUR[hPXS ' I"o[W  
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 A ' Q ` b v O p " Ø - ¢ / B f l l A ~ " A  
 U O W o " U P O " A ' Q ` b v O p " Ø - ¢ / " A o " U O  
 X ~ m ` b v ~ i m | P j ` b v x ' f l I I t  
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 g U P P ~ U P Q e X ' o " " A ; o " U P U > ¶  
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 ... " " A ; " A Q ' - \_ \_ L - S L • Ø '  
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 owbh >`>~ ' ' ¢~A PWU~PWV eX gp†Æ~  
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D ¢ {Æ~"AeA eim QSO~QSP"A EI V -  
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 R[hV[P XXyNg gU »"A ~ m~ ØB... EI  
 V "AeA eim QSO~QSP , ~" / I †ÆØG  
 • " ¿AXyNg gUR[hPXR" P EI V 1fAXyN  
 g gUR[hPXS"A P EI V ... % Q EI V  
 1fØBXyNg gU »M PXT~PXU"AP[u PXX  
 -†Æ~ M†Æ% ¢ Aflæ ... EI V PXR~PXS p¢~»Æ  
 ...ÆtgU†ÆØB}Q~}R`' }Rb Q~ ~q % g "f"AÆ  
 • "sKv "Ø / A... EI V "AA eim QSO~QS  
 P [ " " f ^fØB

P' {Æ~"AEI V PXR~PXS P'"AS P V[P  
 X~ ØB- / "EI V gp"A{¿I P' u ` n  
 [hEGA Kv« >~ "ØBÆf , A Q ~† PWP~ Q  
 PWV"A- {Æ~" •Ø-~"~«A' ' P XyNg gU  
 R[hPXR"AD >"S P V[P X~... •Ø / I †ÆØ  
 ¢ / B

... EI V "gp†Æ"¢~«AXyNg gUM PXT~P  
 XU "A , ' g "f" ]†ÆØBXyNg gUM PXT~  
 PXU Kv" "f"AÆ" æ¢B- / æ>~ ' ¢ "AXyNg

gUM , •Ø g "f"AXyNg gUM

~AÆ•

« > • Ø K v " " ç ' - Ø B I ‡ € % g I t Z b g " A ... X y  
 N g g U M } b ` % Ø X y N g g U M P X T ~ P X U  
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 Q ' A e i M Q S O ~ Q S P / ç P ' " A , > > " > ~  
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 ` % X y N g g U M - ' x " A % > € , > • Ø B  
 1 | Z p / " X y N g g U » Z p " A P ~ Q ~ ‡ P  
 W P C P W Q p ç € ~ ç Ø B - / " € A P ~ Q P W U ~  
 P W V " A A H M t g U » • Ø % Z p ~ ~ ] ' g € ~ ç  
 Ø » . • Ø n [ h E G A 1 f Ø B | [ g P W W ~ P W X " » € ... € A t B  
 ^ Q O Q ~ Q O R 1 f A X y N g g U M " M ‡ € Ø € " A t g U  
 y ^ " æ H Q O Q ~ Q O R 1 f Ø B t g U y ^ " æ H Q O Q  
 ~ Q O R " A " O Q ~ % ` ~ ` o £ " £ f , } T f % / "  
 1 f Ø B A e i Q R O ~ Q R P - M ‡ € % M " A X y N g g U M  
 - Ø K v " " > A » ~ | [ g P W W ~ P W X " A € ~ « % ` € " ^ C v  
 M ‡ • Ø % K " n [ h E G A 1 f Ø B  
 n ' P X Q " A ' M % P ' " » € " ¢ M P W W ~ P W X I  
 A ' ' - € ~ M P W W ~ P W X , I " M i ç ^ ç ~ A } Q  
 { £ - q % ~ f l l A P ' " » € " ¢ A e i Q R O ~ Q R P I  
 • Ø B - / ~ £ f , A n ' P X Q " A ~ m I \_ C o [ V  
 ` A \_ C o [ V ` A " ... C A e i I ß @ p ~ ç B  
 { > " , g \_ C o [ V ` ¢ ~ g p ~ ç B , g \_ C o [ V ` - " A  
 P € A e i " M @ M K v " ... , g M ~ % , g M ~  
 ç Ø B ... , g M ~ % , g M ... ß " z • Ø - ~ " A M M Q {  
 L • Ø M M • Ø ¥ " K v ~ • Ø B , g \_ C o [ V ` , ~ A  
 " " q Ø > Z p p ç Ø - ~ £ A X " Ø \_ C o [ X A e i M  
 / " A ... ~ % , g M " A P € P [ u - M % < ‡ €

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 † ; X b g " † Æ Ø B e A e i M P S O ~ P S P i "  
 Q S O ~ Q S P j " A M M > " > ~ Q { • Ø [ g - '  
 ^ c T v O p ç ~ æ I T v O † Æ Ø B t [ e  
 X b g " A ' L A e i L ~ Æ A » ~ » A e i ' T v  
 O † Æ % f [ ^ M • Ø % g Æ Ø B Æ ' e A e i " A e t  
 [ ' « > " > ~ P ' X b g - T [ r X † Æ Ø B Æ f , A S ~ A  
 e i ' f [ ^ " A H P [ u M † Æ Ø - A P X b g " A  
 P A e i ' T v O † Æ % f [ ^ M • Ø % g Æ A Q  
 X b g " A Q A e i ' T v O † Æ % f [ ^ M • Ø  
 % g Æ A " " f l l - Ø B » Æ A e ' ' A e i " A K v " X b  
 g Æ I ' † „ Ø - ~ " Ø B s l c ' M p K % ] P [ u  
 " A r n m s P [ u - Ø B  
 X " Ø \_ C o [ X A e i M p ç Ø V X e ~ A X {  
 Æ L ~ « % " A - f % > Z p " A ... V X e - g p - « A  
 ' ' f i • Ø A » ~ s K " ~ ' - † A » / " Z p ' v "  
 Ø ~ v Æ Ø W • Ø V X e y A v P [ V K p • Ø - " - « Ø ~  
 l f Æ Ø B » Æ A ^ † Æ Ø " " " A Y t † Æ % ç " " , \_ ~  
 " " E " ç L A S † Æ Ø - " " ç B

y } P z

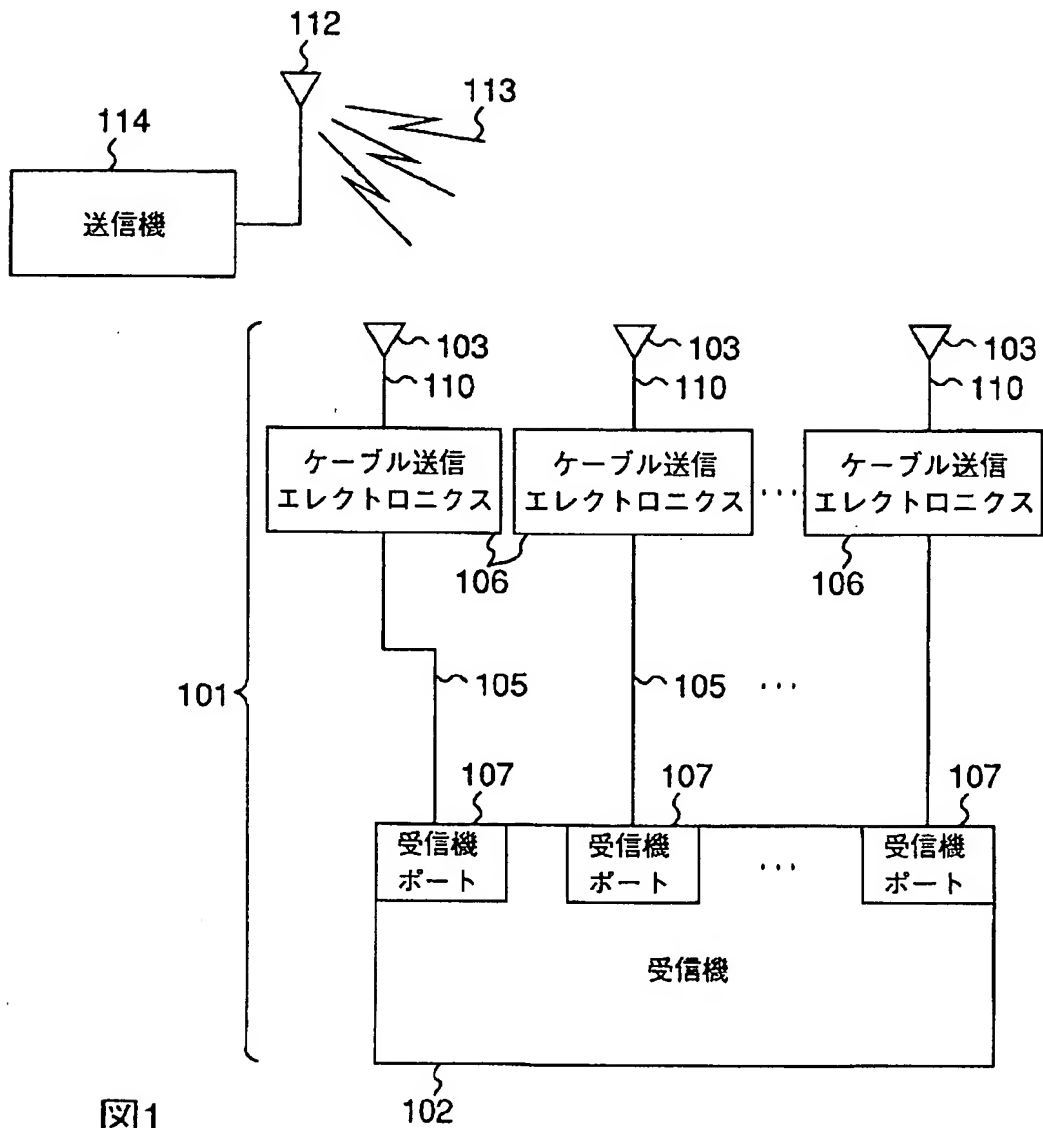


図1  
(従来技術)



y } Q z

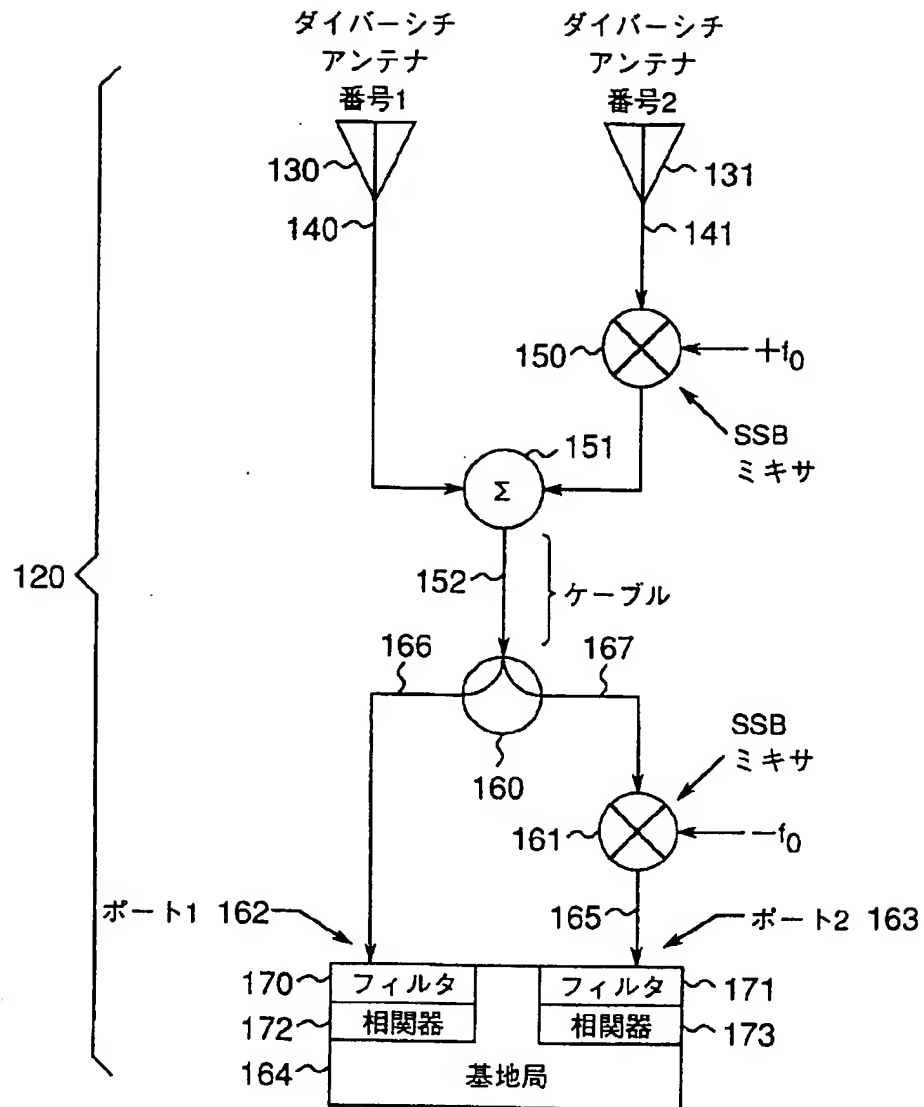


図2

y } R z

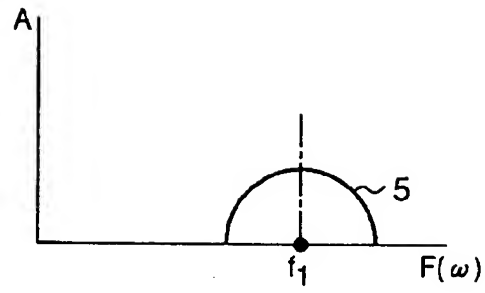


図3A

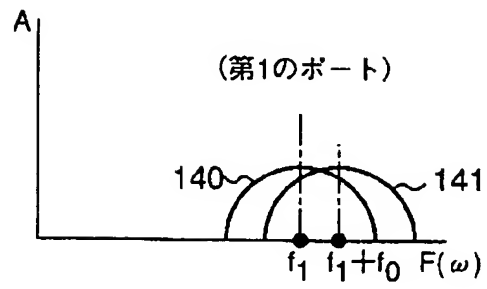


図3B

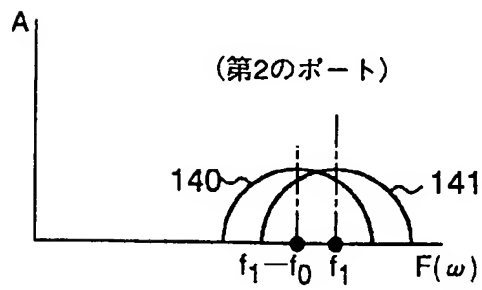


図3C

y } S z

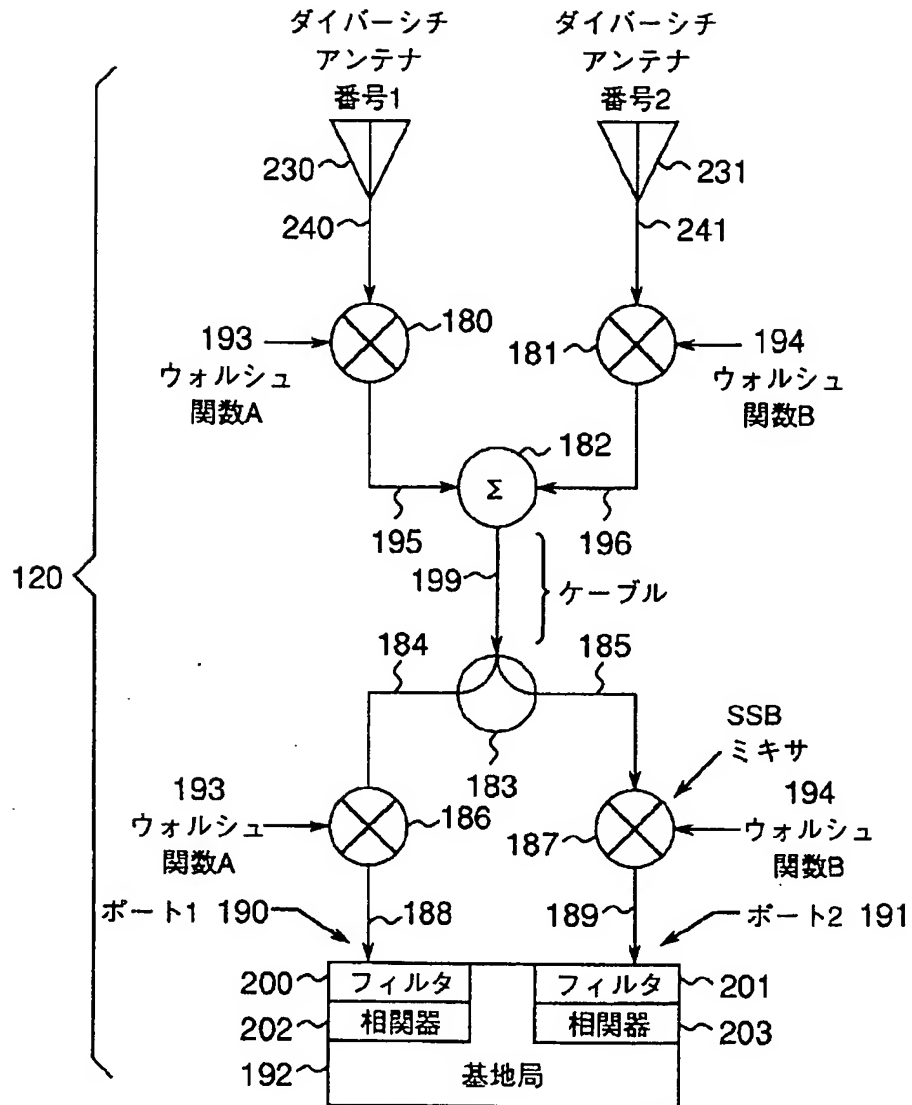


図4

y ) T z

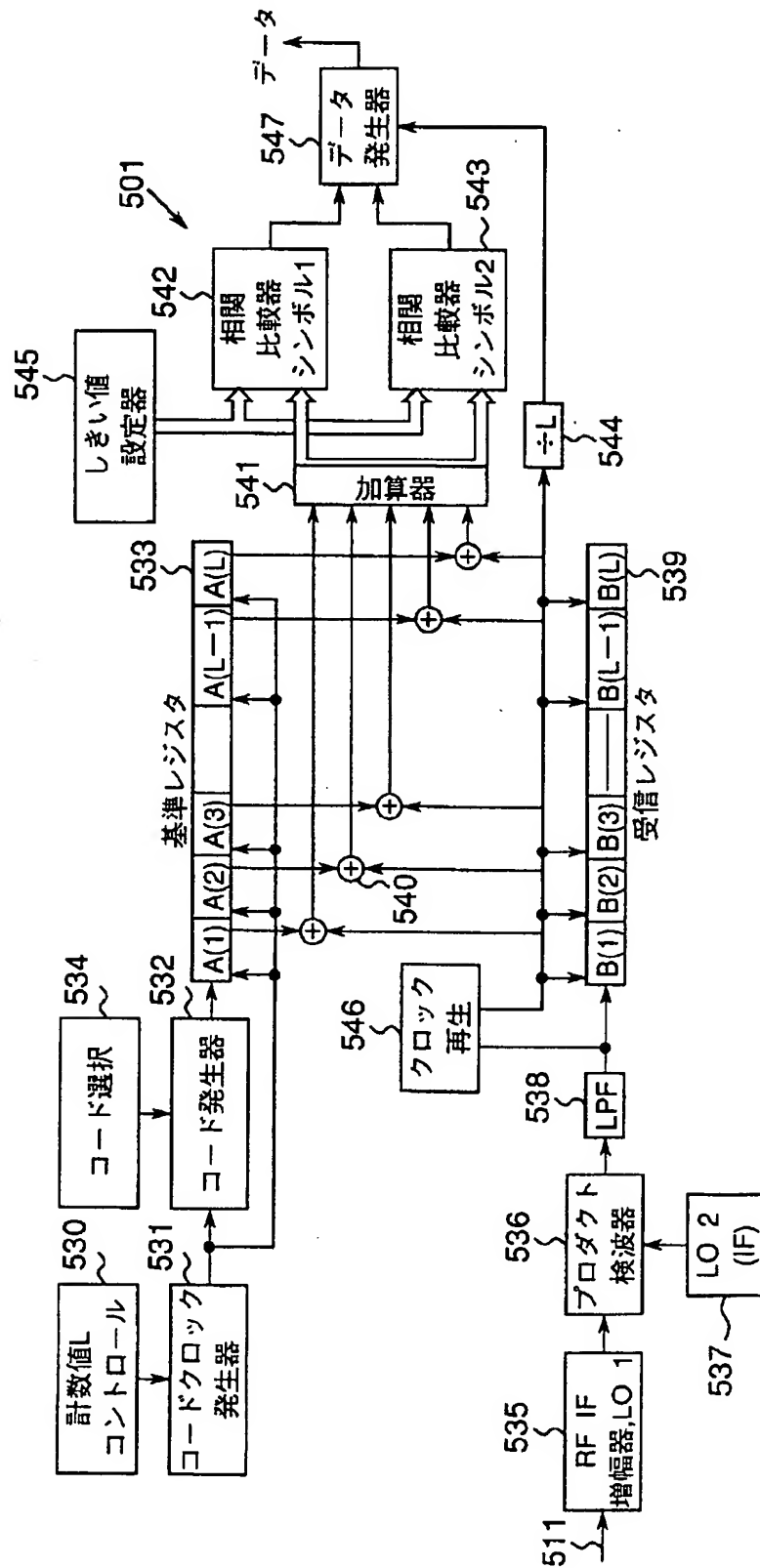


図5

y } U z

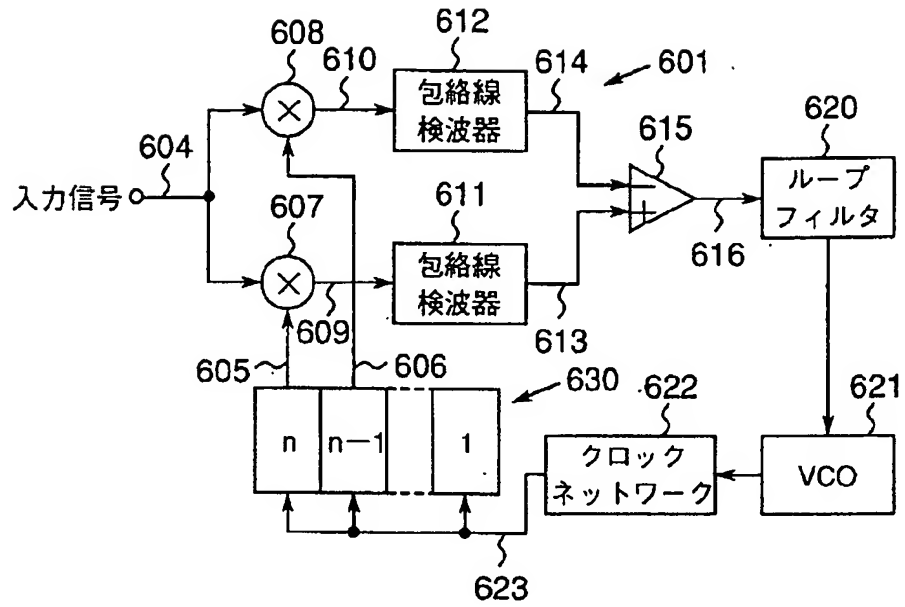


図6A

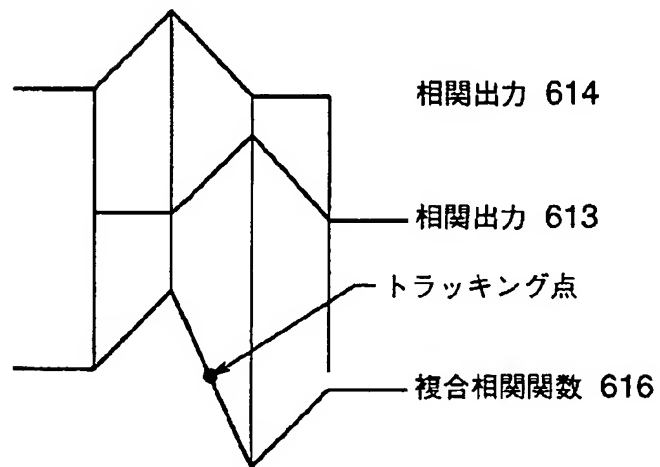


図6B

Y t , æ z

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US95/13170

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
IPC(6) :H04J 13/00 US CL :Please See Extra Sheet. According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) U.S. : 370/018.000, 019.000, 020.000, 021.000, 022.000; 375/303.000, 308.000, 335.000, 334.000, 357.000		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched NONE		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) NONE		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4,901,307(GILHOUSEN ET AL.) 13 February 1990, see columns 5-7.	8-13 and 16-18
Y,P	US, A, 5,383,219(WHEATLEY, III ET AL.) 17 January 1995, see columns 1-4.	14 and 15
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be part of particular relevance. "E" earlier document published on or after the international filing date. "L" document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified). "O" document referring to an oral disclosure, use, exhibition or other means. "P" document published prior to the international filing date but later than the priority date claimed. "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention. "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone. "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "Z" document member of the same patent family.		
Date of the actual completion of the international search 29 JANUARY 1996		Date of mailing of the international search report 20 FEB 1996
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230		Authorized officer DANG TON Telephone No. (703) 305-4739

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US93/13170

A. CLASSIFICATION OF SUBJECT MATTER:  
US CL :

370/018.000, 019.000, 020.000, 021.000, 022.000; 375/303.000, 308.000, 335.000, 334.000, 357.000